A COMPARATIVE STUDY BETWEEN CONVENTIONAL LANGUAGE THERAPY VERSUS CONVENTIONAL LANGUAGE THERAPY WITH CONSTRAINT INDUCED LANGUAGE THERAPY IN THE MANAGEMENT OF POST ISCHEMIC STROKE BROCA'S APHASIA

A Dissertation Submitted In Partial Fulfillment of the Requirements for the Degree of

MASTER OF PHYSIOTHERAPY

With Specialization In

ADVANCED PHYSIOTHERAPY IN NEUROLOGY

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Submitted to

THE TAMILNADU DR. M.G.R MEDICAL UNIVERSITY
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JKK MUNIRAJAH MEDICAL RESEARCH FOUNDATION

COLLEGE OF PHYSIOTHERAPY

Department Of Post Graduate Studies

Komarapalayam - 638 183

April - 2011

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“God guides us if he is…?”

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INTRODUCTION

Stroke is a major non-communicable disease of increasing socio-economic importance in aging populations. According to the world health organization (WHO) Global Burden of Disease report, stroke was the second leading cause of mortality worldwide in 1990 & the third leading cause of mortality in developed countries, (1), causing approximately 4.4 million deaths worldwide. (2), the most recent estimates showed that in 2002, the number of deaths due to stroke reached 5.51 million worldwide, with two-thirds of these deaths occurring in developing countries. Stroke also is a major cause of long-term disability, & has an enormous emotional & socioeconomic impact on patient, families & health services.

Speech & language problems are common sequelae of stroke that significantly impact the daily lives of stroke survivors. Reduced speech & language skills have negative ramifications on the individual's social, vocational & recreational activities, often leading to social isolation, loneliness. Given the importance of communication to the stroke survivor's quality of life, it is essential that rehabilitation professional's recognized & address the speech & language disorders associated with stroke.

Normal speech & language is extraordinarily complex. A number of steps are required, some accomplished sequentially & some in parallel that incorporate the following:

(a) Conceptualization of an idea & generation of a communicative goal.

(b) Formulation of a grammatically structural sequence of verbal symbols (words), each consisting of an interacting set of ordered sounds.

(c) Selection of a series of neural commands (or) sensorimotor "programs" that will activate co articulated times, durations, & intensities

(d) Central & peripheral nervous system innervations of muscles of respiration, phonation, resonance, & articulation to produce the intended acoustic signal.

Stroke can disrupt any of the stages of speech & language, resulting in one (or) more of the disorder of aphasia. Disruption to the initial stage involving the structure & rules of the linguistic message results in aphasia.

Aphasia has been defined as a multimodality language disorder resulting from damage to brain areas that sub serves the formulation & understanding of language & its components (i.e., phonology, syntax, morphology & semantics).

Broca's aphasia:

It is a motor aphasia (or) non-fluent aphasia. In this type of aphasia, speech output is highly reduced and is limited mainly to short utterances of less than 4 words**.** The vocabulary access is limited and the sound

formation by the patients with Broca's aphasia is often laborious and clumsy. The patient may understand speech relatively well and also be able to read, but be limited in writing**.** Broca's aphasia is often named as a 'non fluent aphasia' due to the halting of the speech.

Fluency:

- Non-fluent
- Slow & effortful output
- Short phrase length (less than 4 words)
- Disrupted prosody of speech.

Oral Expression:

- Agrammatism: Uses primarily substantive content words (nouns, verbs) with few functional words (pronouns, prepositions, articles), most sentences are simplified.

- May have an associated apraxia of speech.

Auditory Comprehension:

- Relatively good comprehension except for sentences that involve syntactic complexity.

Repetition:

- Poor.

Restoration of normal communicational activities of patient is the primary goal of rehabilitation. To reach the aim the physiotherapist can use conventional language therapy and constraint induced language therapy.

Conventional language therapy includes Exercise, Naming, Repetition, sentence completion, following the instructions of therapist and Conversation. The conventional language therapy helps the patient to relearn the simple communicable activities.

Constraint induced language therapy includes Word Games like (i) Material constraint (use of minimal pairs), (ii) Shaping & rule constraints (form sentences), (iii) Reinforcement constraints. The constraint induced language therapy helps the patient to improve the communicable activities.

The combination of conventional language therapy and constraint induced language therapy would bring about excellent improvements in communicational activities.

The commonly used parameter to evaluate the outcome of treatment procedures are the western aphasia battery.

The parameter selected for this study is the western aphasia battery. The pre & post test values of western aphasia battery will be computed in numbers for comparison.

Thus the study intended to compare the effect of conventional language therapy versus conventional language therapy and constraint

induced language therapy in improving the communicational activities of stroke patient.

This study facilitates to find out the most effective treatment to improve the communicational activities of stroke patients in society at the earliest.

AIMS AND OBJECTIVES

AIM OF THE STUDY

To compare the effectiveness of conventional language therapy versus conventional language therapy with constraint induced language therapy in the management of post ischemic stroke Broca's aphasia.

OBJECTIVES OF THE STUDY

- To determine the effectiveness of conventional language therapy in the management of post ischemic stroke Broca's aphasia.
- To determine the effectiveness of constraint induced language therapy in the management of post ischemic stroke Broca's aphasia.
- To determine the effectiveness of conventional language therapy versus conventional language therapy with constraint induced language therapy in the management of post ischemic stroke Broca's aphasia
- To find out the effective treatment regarding language functional status in post ischemic stroke Broca's aphsia.

HYPOTHESIS

NULL HYPOTHESIS

The null hypothesis states that there was no any significant difference between conventional language therapy versus conventional language therapy with constraint induced language therapy in the management of post ischemic stroke Broca's aphasia.

ALTERNATE HYPOTHESIS

The alternate hypothesis states that there was significant difference between conventional language therapy versus conventional language therapy with constraint induced language therapy in the management of post ischemic stroke Broca's aphasia

REVIEW OF LITERATURE

1. Pulvermuller F, et. al., (2001)

Conducted a study on patients having chronic aphasia were assigned randomly to one group to receive either conventional language therapy or constraint induced language therapy. Patients in both groups received the same level of treatment (30 to 35 hours) as 10 days of massed practice language exercises for the CILT group (3 hours/day minimum; for 10 patients) or over a longer period of approximately 4 weeks for the conventional language therapy group (7 patients). CILT led to significant and pronounced improvements on approved clinical tests, on self-ratings, and on blinded observer readings of the patient's communicative effectiveness in day to day life. Results suggest that the language skills of patients having chronic aphasia can be improved in a short course by the use of an appropriate massed practice method that focuses on the patient's communicative needs.

2. Swearengin JA, et. al., (2006)

Conducted a pilot study on a group of individuals with chronic aphasia. Here we compared treatment that required forced use of the language modality, CILT, to treatment allowing all modes of communication. Both treatments were administrated intensively, using the same therapeutic stimuli& tasks. The results suggest that whereas both interventions yielded positive outcomes, but CILT group showed more consistent improvement on standard aphasia measures and clinician

judgments of narrative discourse. Thus these results findings suggest that CILT intervention may be a viable approach to aphasia rehabilitation.

3. Jerzy P. Szaflarski et. al.,

Conducted a pilot study on three male patients with moderate to severe post-stroke aphasia. They received CILT 3-4 hours per day for 5 successive days. Pre and post testing included formal language evaluation, linguistic analysis of story retell and mini communication activity log. Results showed substantial improvements in comprehension and verbal skills. Thus the results indicate that the CILT is useful tool in language restoration in after stroke.

4. Meinzer M, et. al., (2005)

Conducted a study on 27 patients with chronic aphasia received 30 hours of treatment over 10 days. 12 patients were trained with CILT program, for 15 patients the training included a module of written language and an additional training in everyday communication plus CILT. The outcome measures included standardized neurolinguistic testing. The results showed more pronounced and increased language function for patients of the group CILT plus. Thus this effective intervention can be successfully used in the rehabilitation of chronic aphasia patients.

5. Sanjit K. Bhogal BA et. al.,

Conducted a recent study on aphasic patients had determined that intense aphasia therapy (CILT)over a short period of time has greater

impact on recovery than less intense therapy over a longer period of time. Thus this study examines other aspects of aphasia therapy that may be combined to facilitate recovery. Several areas of aphasia therapy have proven to be more effective than others.

6. Cynthia M. Shewan et. al., (2004)

Conducted a study on aphasic patients who received one of three types of speech and language treatment was compared with that in aphasic patients who received no treatment. One hundred aphasic patients were followed from 2 to 4 weeks post on set for 1 year or until recovery, using a standardized test battery administered at systematic intervals. Both treatment methods were provided, while the method provided by trained nonprofessionals approached statistical significance. Small group size prevented resolution of the question of whether one type of treatment was superior to another. Thus the results show that language therapy improves the language status of aphasic patients.

7. Robert Teasell, MD et. al.,

Conducted a study on post stroke aphasic patients. The aim of the study is to evaluate the relationship between the intensity of aphasia therapy and aphasia recovery. Alterations in mean scores from all studies were recorded. Intensity of the therapy was recorded in means of length of therapy, hours of the therapy provided per week, and the total hours of therapy provided. Pearson correlation was used to check the relationship between changes in average scores of outcome measures and the intensity of therapy. Studies that explained a significant treatment effect gave 8.8

hours of therapy per week for 11.2 weeks versus the negative studies that only gave ≈2 hours per week for 22.9 weeks. On a mean, positive studies provided a total of 98.4 hours of the therapy, whereas the negative studies provided 43.6 hours of the therapy. Total length of therapy time was judged to be inversely correlated with hours of therapy provided per week (P=0.003) and total hours of therapy given (P=0.001). Total length of therapy was inversely correlated with mean changes in Porch Index of Communicative Abilities (PICA) scores (P=0.0001). The number of hours of therapy given in a week was significantly related to greater improvement on the PICA (P=0.001) and the Token Test (P=0.027). Total number of hours of therapy was significantly correlated with higher improvement on the PICA (P<0.001) and the Token Test (P<0.001).Thus intense therapy (CILT) over a short duration of time can improve outcomes of language therapy for stroke patients with aphasia.

8. Kelly H et. al., (2009)

Conducted a study on person with aphasia. They identified 30 trials involving 1840 randomized participants that were suitable for inclusion in this review. Overall, the review shows evidence from randomized trials to suggest there may be a benefit from speech and language therapy.

9. Karyn pingel et. al., (2010)

Conducted a study on 9 patients with chronic non fluent aphasia and the patients are selected by Nonrandomized control trial. One group is treated with constraint induced language therapy and next one is treated with conventional language therapy. Both groups received treatment 3h/d, 4d/wk for 2 consecutive weeks. The main outcome measure is Western

aphasia battery, Boston Naming Test, Action Naming Test, and linguistic analyses. Although participants in both groups evinced positive outcomes post treatment, the results suggest that CILT subjects showed increased performance on more measures than the traditional subjects.

10. Lynn Maher et. al., (2008)

Conducted a study on 48 patients with chronic aphasia. They are randomly assigned for this study. After the treatment session results suggest that individuals with chronic aphasia made substantial, measurable change on a language battery following intensive CILT in regarding with a standardized assessment tool. The main purpose of this study is to investigate the effects of intensive, constraint induced language therapy (CILT) for individuals with chronic aphasia compared with traditional aphasia therapy.

11.Berthier ML, et. al., (2009)

Conducted a randomized, double blind, placebo-controlled, parallel group study of both memantine and CILT on chronic post stroke aphasia. Patients were randomized into two groups for interventions after baseline evaluations. The main outcome measure is Western aphasia battery and communicative activity log. In accordance with Western aphasia battery and communicative activity log the best outcomes were achieved combining memantine with CILT subjects.

12.Anastasia Raymer et, al., (2009)

Conducted a study on a small group of patients with aphasia to examine the effectiveness of constraint induced language therapy (CILT), in which they are received CILT. In contrast to other aphasia treatment approaches like conventional language therapy. In CILT improved verbal responses than conventional language therapy in accordance with a standardized measurement tool. It is indicated by increase in assessment score. The treatment is provided on an intensive schedule, up to three hours per day for five days per week. Thus the result was concluded that CILT was useful in rehabilitation of language function in aphasia.

MATERIALS AND METHDOLOGY

MATERIALS

- Couch.
- Chair.
- Pillow.
- Token.
- Picture cards.
- Western aphasia battery scoring sheet.

METHODOLOGY

Study Design

Quasi Experimental Study Design.

Study Setting

The study was conducted at out patient department in J.K.K. Munirajah Medical Research Foundation College of Physiotherapy, Komarapalayam and District Head Quarters Hospital, Erode under the supervision of the concerned authorities

Sampling Method

Convenient sampling method.

Sample Size

Thirty patients with Ischemic Stroke Broca's aphasia, who comes under the inclusion criteria, were taken for the study.

Study Duration

The study was conducted for a course of 4 months (5 sittings per week).

Inclusion Criteria

- Age group – 40-60 years.
- Both sexes.
- Right-handed persons
- Primary Language is Tamil.
- Adequate hearing and vision to participate in language therapy
- Unilateral Left CVA involvement
- Moderate To moderately severe aphasia.
- Non-fluent aphasia
- Cognition > 11(MMSE).

Exclusion Criteria

- Degenerative or Metabolic illness.
- Severe depression or psychiatric disorders.
- Brainstem stroke.
- Recurrent stroke
- History of other neurological impairment (e.g. dementia)
- Non-Tamil speaking

- Deaf and dumb
- Severe apraxia of speech.

Parameters

- Western Aphasia Battery
- Token Test.
- Mini Mental State Examination
- Porch Index of Communicative Abilities (PICA).

Technique:

Conventional language therapy

- ✓ Exercises
- ✓ Naming
- ✓ Repetition
- ✓ Sentence completion
- ✓ Following instructions
- ✓ Conversations on patients interest topic's

Constraint induced language therapy

Constraint means: Avoiding the use of compensatory strategies such as gesturing, drawing, writing etc.

Forced use **:** Means communicating by talking, and

Massed practice **:** Means 2 to 4 hrs of speech therapy a day.

- ✓ Word Games
- ✓ Material constraints
- ✓ Shaping and rule constraints
- ✓ Reinforcement contingencies

Procedure

A total number of 30 patients having Ischemic Stroke Broca's aphasia who met the inclusion criteria were recruited by convenient sampling method. After the informed consent obtained, they were partitioned into two groups as Group A and Group B, with 15 patients in each.

Hence prior to the onset of treatment, pre-tests were conducted using Western Aphasia Battery and results were recorded for both groups.

After a clarifying demonstration about Conventional language therapy, Group A subjects were subjected to Conventional language therapy with supervised for a period of 4 months.

After a clarifying demonstration about Conventional Language Therapy with Constrained induced language therapy, Group B subjects were subjected to Conventional Language Therapy with Constrained induced language therapy for a period of 4 months.

In the last session, a post test was conducted using Western Aphasia Battery and the results were recorded.

In fine, the analysis of the recorded results was carried out for the purposes of comparing the pre-test Vs post-test results, in turn the treatment techniques.

Statistical Tool

The statistical tools used in the study were paired‘t’ test and unpaired‘t’ test.

Paired‘t’ test:

The paired‘t’ test was used to find out the statistical significance between pre and post test of patients treated with Conventional Language Therapy and Constrained induced language therapy in Ischemic Stroke Broca’s Aphasia separately.

Formula: Paired‘t’ test:

$$s = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

d = difference between pre test Vs post test values

$\bar{d}$ = mean difference

n = total number of subjects

s = standard deviation.

Unpaired ‘t’ test:

The unpaired ‘t’ test was used to compare the statistically significant difference between Group A and Group B.

Formula: Unpaired ‘t’ test:

$$s = \sqrt{\frac{(n_1 - 1)s_1^{\,2} + (n_2 - 1)s_2^{\,2}}{n_1 + n_2 - 2}}$$

$$t = \frac{\left|\bar{x}_1 - \bar{x}_2\right|}{s\sqrt{{}^{1}/_{n_1} + {}^{1}/_{n_2}}}$$

n_1 = total number of subjects in group A

n_2 = total number of subjects in group B

x_1 = difference between pre test Vs post test of group A

$\bar{x}_1$ = mean difference between pre test Vs post test of group A

x_2 = difference between pretest Vs post test of group B

$\bar{x}_2$ = mean difference between pre test Vs post test of group B

s = standard deviation.

DATA PRESENTATION

TABLE -I

S.No	GROUP- A Conventional Language Therapy		GROUP- B Conventional Language Therapy with Constraint Induced Language Therapy	
	Pre-Test	**Post-Test**	**Pre-Test**	**Post-Test**
1.	44	63	45	75
2.	46	61	45	73
3.	42	69	42	75
4.	43	61	44	80
5.	45	65	43	81
6.	44	65	50	80
7.	43	60	49	73
8.	44	66	44	75
9.	49	70	43	75
10.	50	73	43	80
11.	43	67	45	72
12.	44	66	43	80
13.	42	62	42	75
14.	45	68	46	81
15.	45	69	44	82

DATA ANALYSIS AND INTERPRETATION

This portion deals with the analysis and interpretation of the data collected from group A and Group B who underwent Conventional Language Therapy And Constraint induced Language therapy

TABLE – II

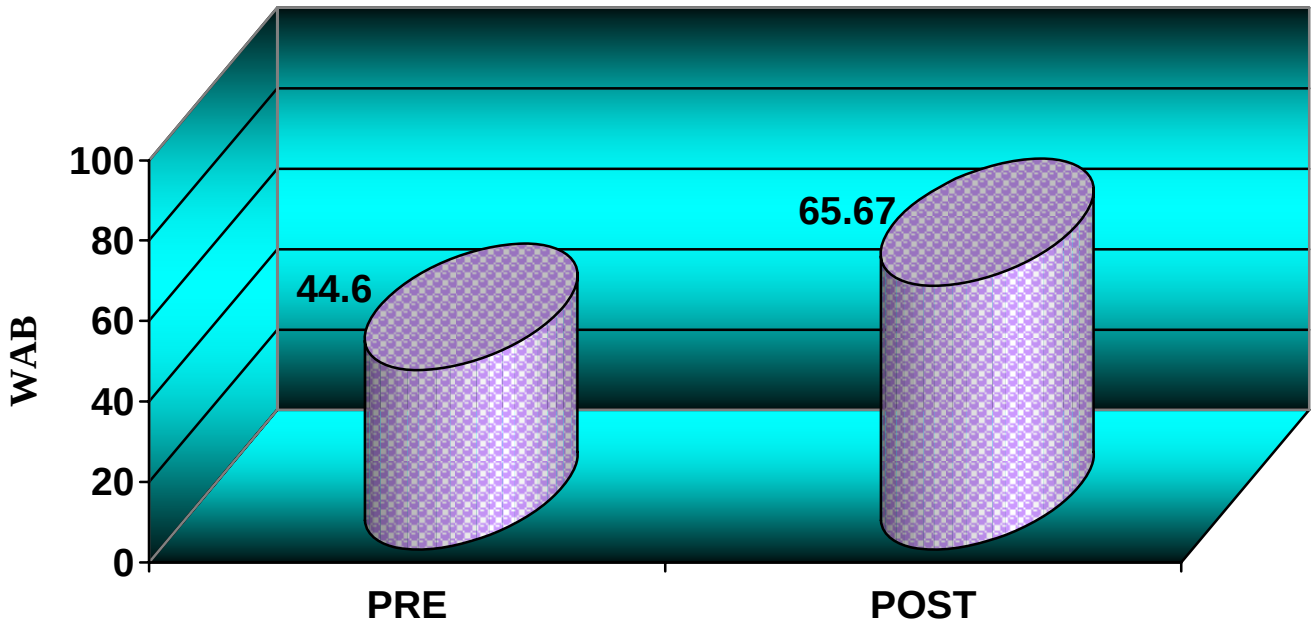
Group – A

Table II represents the mean values, mean difference, standard deviation, and paired 't' value between pre test Vs post test values of Patient Rated Broca's Aphasia Evaluation for group A who have been subjected to Conventional Language Therapy.

Western Aphasia Battery	Mean	Mean difference	Standard deviation	Paired 't' value
Pre test	44.6	21.07	3	26.31
Post test	65.67			

It shows the analysis of Broca's Aphasia Evaluation; the paired 't' value of pre Vs post sessions of group A was 26.31 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant difference in between pre Vs post test results. The pre test mean was 44.6, the post test mean was 65.67 and mean difference was 21.07, which showed that there was a decrease in Broca's Aphasia Evaluation in post test indicating the recovery of selected samples in response to intervention.

Graph I –Western Aphasia Battery Evaluation of Group - A



Pre & Post test values

TABLE - III

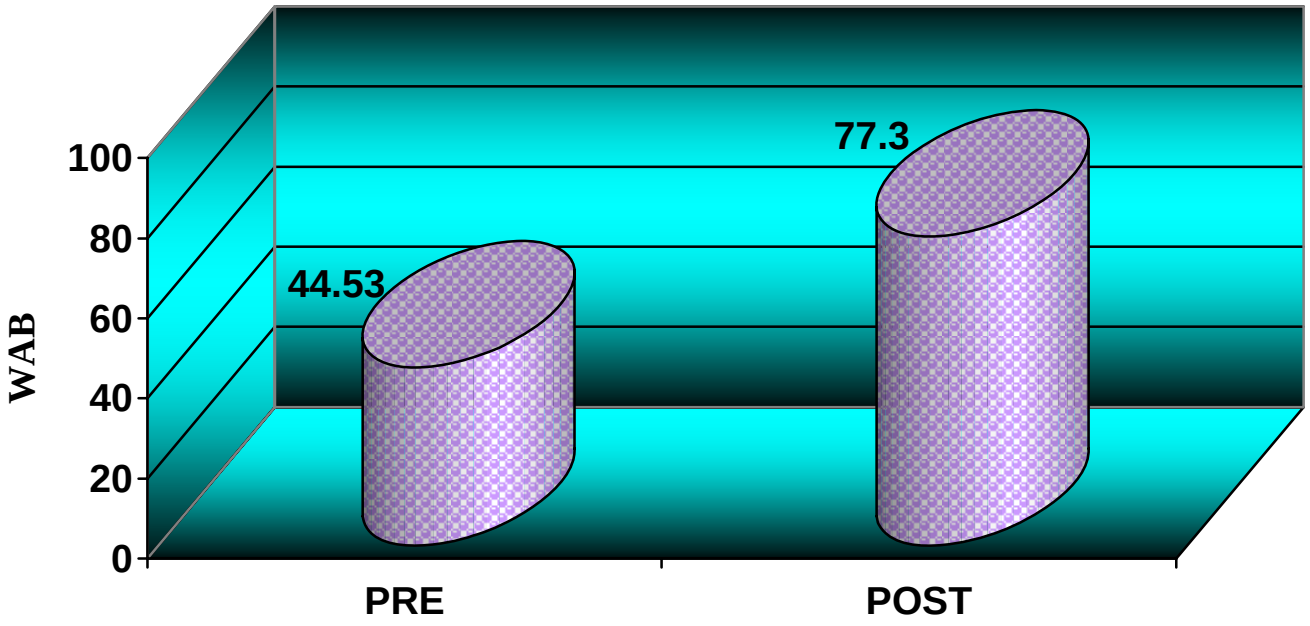
Group – B

Table III represents the mean values, mean difference, standard deviation, and paired‘t’ value of Broca’s Aphasia Evaluation for group B, who have been subjected to Conventional Language Therapy And Constraint induced Language therapy

Western Aphasia Battery	Mean	Mean difference	Standard deviation	Paired ‘t’ value
Pre test	44.53	32.6	4.29	29.41
Post test	77.3			

Table III shows the analysis of Broca’s Aphasia Evaluation; the paired‘t’ value of pre Vs post sessions of group B was 29.41 at 0.05 level of significance, which was greater than the tabulated value of 2.15. This showed that there was a statistical significant difference in between pre Vs post test results. The pre test mean was 44.53, the post test mean was 77.13 and mean difference was 32.6, which showed that there was a decrease in Broca’s Aphasia Evaluation in post test indicating the recovery of selected samples in response to intervention.

Graph II – Western Aphasia Battery Evaluation of Group - B



Pre & Post test values

TABLE – IV

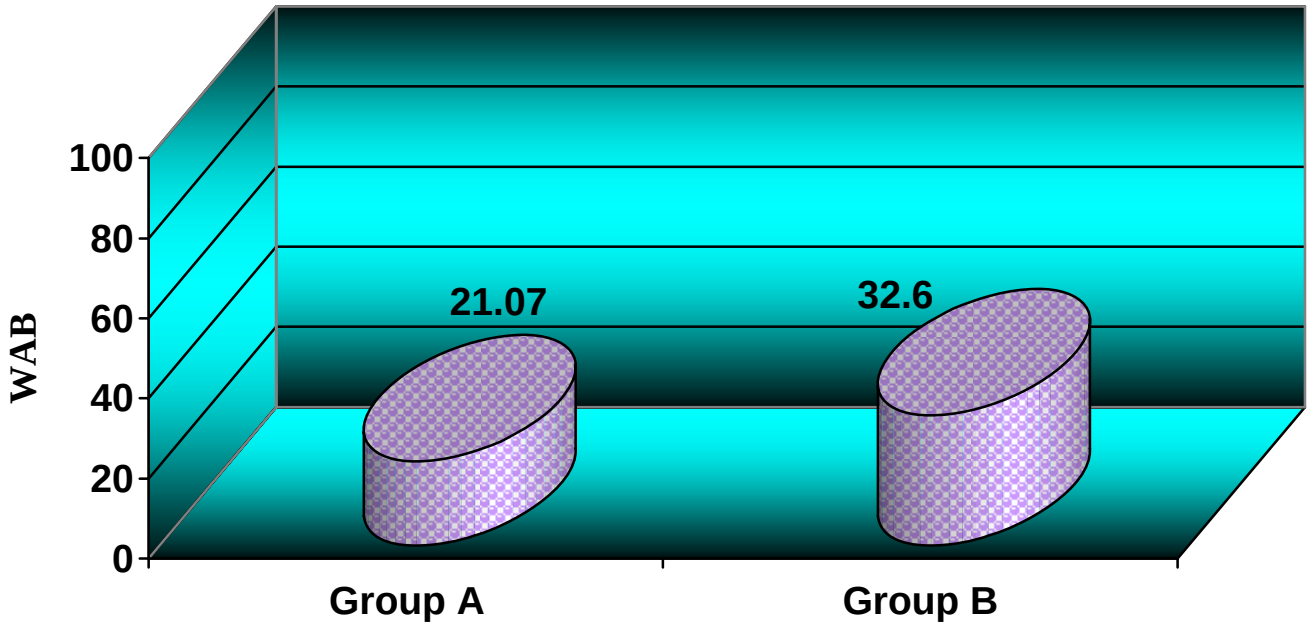
Table IV represents the comparative mean values, mean difference, standard deviation, and unpaired‘t’ value between group A and group B on Broca’s Aphasia Evaluation.

Western Aphasia Battery	Mean	Mean difference	Standard deviation	Unpaired ‘t’ value
Group A	21.07	11.53	3.7	8.54
Group B	32.6			

Table IV shows the analysis of group A and group B with Broca’s Aphasia Evaluation. The unpaired‘t’ value of 8.54 was greater than the tabulated unpaired ‘t’ value of 2.05 at 0.05 level of significance which showed that there was statistically significant difference between group A and group B. The mean value of group A was 21.07 and the mean value of group B was 32.6, and the mean difference was 11.53 which showed that there was a greater improvement in group B when compared to group A.

Therefore, the study is rejecting the null hypothesis and accepting the alternate hypothesis.

Graph III - Mean difference of Group A and Group B – Western Aphasia Battery



DISCUSSION

The aim of the study was to compare the effectiveness of Conventional language therapy versus Conventional language therapy with Constraint induced language therapy in improving language function in ischemic stroke Broca's aphasia.

Based on **Berthier ML**. et.al., (2009) **Karyn pingel et.al., (2010)** Studies Western Aphasia Battery was selected as parameter in present study.

In the analysis and interpretation of Language function in group A:

The paired 't' value of 26.31 was greater than the tabulated paired 't' value of 2.15, which showed that there was statistically significant difference at 0.05 level of significance and 14 degrees of freedom between pre and post results. The pre test mean was 44.6, post test mean was 65.67 and mean difference was 21.07, which showed improvements regarding language functional status in response to Conventional language therapy after 4 months.

In the analysis and interpretation of Language function in group B:

The paired 't' value of 29.41 was greater than the tabulated paired 't' value of 2.15, which showed that there was statistically significant difference at 0.05 level of significance and 14 degrees of freedom between pre and post results. The pre test mean was 44.53, post test mean was 77.13 and mean difference was 32.6, which showed improvements regarding

language functional status in response to Conventional language therapy with constraint induced language therapy after 4 months.

The results of studies conducted by **Jerzy P. Szarflarski.et.al., Meinzer M et.al., Anastasia Raymer,** supported the present study in which Conventional language therapy with constraint induced language therapy was given.

IN THE COMPARISON OF GROUP – A AND GROUP – B:

In the analysis and interpretation of Language Function between group A and group B:

In the analysis and interpretation of Language function, the unpaired‘t’ value of 8.54 which is greater than the tabulated ‘t’ value of 2.05, at 0.05 level of significance and 28 degrees of freedom, which showed that there was statistically significant difference between the pre test Vs post test results of group A and group B. The mean value of group A was 21.07, mean value of group B was 32.6 and mean difference was 11.53 which showed that there was significant improvements regarding language functional status in group B compared to group A in response to treatment.

Based on the statistical analysis and interpretation of the results, the present study showed that there was significant improvement regarding language functional status based on (increase) in Western Aphasia Battery in patients with Ischemic Stroke Broca’s Aphasia treated with Conventional language therapy with onstraint induced language therapy.

Therefore, the present study is accepting alternate hypothesis and rejecting null hypothesis.

Reason for Improvements in Conventional Language Therapy

- ✓ It increases the efficiency and strength of language skills.
- ✓ In conventional language therapy regular exercise and practices are used. It helps to strengthen the weak muscles and to prevent it from further degeneration.
- ✓ Reactivation of the cortex was due to increased responsiveness of weak inputs from neighboring areas.
- ✓ It takes over of existing descending pathways from premotor and supplementary motor cortex which is involved in language control.
- ✓ It used to help a survivor of an aphasic regain his ability to talk, recognize voice patterns and regain the ability to relate words to images.
- ✓ It helps to regaining control over the voice cords is an important part of therapy.

Reason for improvements in constraint induced language therapy

- ✓ Constraint induced language therapy is very intensive treatment with sessions lasting for up to 6 hours over the course of 10 days so it gives repeated stimulus to brain.
- ✓ Constraint induced language therapy principles are motivated by neuroscience insights about learning at the level of nerve cells (synaptic plasticity). So it helps to regain language skills.
- ✓ Constraint induced language therapy contrasts sharply with traditional therapy by the strong belief that mechanisms to compensate for lost language function should not be used unless absolutely necessary, even in everyday life.
- ✓ It make coupling between cortical systems for language and action in the human brain and it reverses the elements of learned disuse.
- ✓ It produces some reorganizational changes during language practice.

Reason for improvements in conventional language therapy with constraint induced language therapy

- ✓ It enhances both parallel and hierarchical processing with in central nervous system which induced stored areas of the brain and it result in enhancing effective recovery.
- ✓ It consists of various throat and neck exercises, such as Cognitive Linguistic Therapy.

  Cognitive Linguistic Therapy concentrates on the patient's emotions, coaching them on how to respond to tones of voice or words describing emotions, such as "happy."

- ✓ It encourages the patients ("constrained") to use their remaining verbal abilities to succeed in the communication game.
- ✓ Here the interaction is guided by communicative need in a language game context, picture cards, and the barriers making it impossible to see other players' cards, and other materials, so that it induces active participation of patient.
- ✓ It is believed that CILT works by the mechanism of increased neuroplasticity. By constraining an individual to use only speech, it is believed that their brain can reestablish old neural pathways and recruit new neural pathways to compensate for lost function

SUMMARY AND CONCLUSION

SUMMARY

The aim of the study was to compare the effectiveness of Conventional language therapy alone with combined effect of Conventional language therapy and constraint induced language therapy on language function in Ischemic stroke Broca's aphasia.

A total number of 30 subjects with Ischemic stroke Broca's aphasia were selected by convenient sampling method after considering the inclusion and exclusion criteria. Then informed consents were obtained from subjects individually.

Western Aphasia Battery was taken as the parameter. Pre test data were collected for group A and group B patients and computed.

Group A patients were subjected to Conventional language therapy and Group B patients were subjected to Conventional language therapy and constraint induced language therapy for a period of 4 Months. The results of the same parameter were recorded for comparison after four months of treatment.

The paired "t" test was used to compare the pre versus post test results of Group A and Group B separately. The unpaired "t" test was used to compare the mean difference of Group A and Group B.

In the analysis and interpretation of WAB between Group A and Group B, the unpaired “t” test value was 8.54 at 0.05 levels which were greater than the tabulated “t” value of 2.04 which showed that there was statistically significant difference between the results of Group A and Group B. The mean value of Group A was 21.07 and Group B was 32.6 and mean difference was 11.53 which showed that there was a significant improvement in language function in Group B compared to Group A in response to intervention.

CONCLUSION

Based on statistical analysis, the results of this study showed that there was significant improvement in both groups. The results also showed that the subjects who participated in experimental Group B had shown good improvement on language functional status than the control Group A.

Based on the results, this study concluded that both Conventional language therapy versus Conventional language therapy with constraint induced language therapy improve the language function of Ischemic Stroke Broca’s Aphasia. Meanwhile, the Conventional language therapy with constraint induced language therapy is more effective than the Conventional language therapy improving the language function in Ischemic Stroke Broca’s Aphasia.

RECOMMENDATIONS

- A similar study can be conducted for large sample of patients.

- CILT is based on the principles of CIMT, so by which you can give suggestions to treat extremities problems also.

- A similar study can be conducted in other types of aphasia also.

- Porch Index of Communicative Abilities (PICA) grading system can be used to measures the outcome of comparative effects of conventional language therapy versus conventional language therapy with constraint induced language therapy in Broca's aphasia.

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APPENDIX

DEFINITION OF TERMS

STROKE

Stroke is a sudden onset of focal neurological deficit resulting from ischemic or hemorrhagic lesions in brain.(WHO).

ISCHEMIC STROKE

This is the most common type of stroke; caused by an interruption in the flow of blood to the brain. It is also named as "plug-type" strokes. The blocked arteries starve parts of the brain handling sight, speech, sensation, and movement so that these actions are partially or completely lost.

APHASIA

It is a multi modality language disorder resulting from damage to brain areas that sub serves the formulation and understanding of language and its components.

BROCA'S APHASIA:

It is a motor aphasia (or) non-fluent aphasia. In this type of aphasia, speech output is highly reduced and is limited mainly to short utterances of less than 4 words**.** The vocabulary access is limited and the sound formation by the patients with Broca's aphasia is often laborious and clumsy. The patient may understand speech relatively well and also be able to read, but

be limited in writing**.** Broca's aphasia is often named as a 'non fluent aphasia' due to the halting of the speech.

FLUENCY:

- Non fluent
- Slow and effortful output
- Short phrase length (less than 4 words)
- Disrupted prosody of speech

ORAL EXPRESSION:

- Agrammatism (most sentences are simple)

AUDITORY COMPREHENSION:

- Good comprehension

REPETITION:

- Poor.

PARAMETER

WESTERN APHASIA BATTERY

The Western Aphasia Battery or WAB is a tool for assessing the language function of adults, able to discern the presence, degree, and type of aphasia. The aphasia quotient (AQ) is a summary score which shows the overall severity of language impairment.

The Western Aphasia Battery (Shewan & Kertesz,1980) was framed to give a means of measuring the major clinical aspects of language function: content, fluency, auditory comprehension, repetition and naming plus reading, writing and calculation. The scoring shows two main totals, in addition to some subscale rates. These are the Aphasia Quotient (AQ) and Cortical Quotient (CQ) scorings. AQ can essentially be thought of as a grade of language ability, while CQ is a more general measure of intellectual ability and includes overall subscales. Administration of the Western Aphasia Battery (WAB) gives a total score called the Aphasia Quotient (AQ), which is said to reflect the severity level of the spoken language deficit in aphasia. This measure is a weighted composite of performance on a 10 separate WAB subtests.

It has two main divisions. They are…,

- ✓ Aphasia Quotient (AQ)
- ✓ Cortical Quotient (CQ)

Note: Aphasic Quotient only considered here.

1. SPONTANEOUS SPEECH:

Record patient's speech on paper and tape. Substitute similar questions if necessary or appropriate. Score fluency and information content according to criteria on page 3.

1. How Are You Today?

2. Have You Been Here Before?

3. What Is Your Name?

4. What Is Your Address?

5. What Is Your Occupation?

6. Tell Me A Little About Why You Are Here? Or What Seems To Be The Trouble?

7. Description of Picture.

   Present test picture (Card 1) and say: "Tell me what you see. Try to talk in sentences." Encourage the patient to pay attention to all aspects of the picture. Move the picture towards the patient's intact visual field. Ask for more complete response if only a few words are produced.

   Maximum Score 20

   Patient's Score ___

SCORING OF SPONTANEOUS SPEECH

(A) Information Content

(0) No Information

(1) Incomplete responses only, e.g. first name or last name only.

(2) Correct response to any 1 item.

(3) Correct responses to any 2 items.

(4) Correct responses to any 3 items.

(5) Correct responses to any 3 of the first 6 items plus some response to picture.

(6) Correct responses to any 4 of the first 6 items plus some response to picture.

(7) Correct responses to 4 of the first 6 items on page 2 and a mention of at least 6 of the items in the picture.

(8) Correct responses to 5 of the first 6 items, and an incomplete description of the picture. Recognizable phonemic paraphasias are to be counted as correct.

(9) Correct responses to all 6 items on page 2. An almost complete description of the picture: at least 10 people, objects, or actions should be named. Circumlocution may be present.

(10) Correct responses to all 6 items on page 2 and to the picture. Sentences of normal length and complexity, referring to most of the items and activities. A reasonably complete description of the picture.

B. Fluency, Grammatical Competence, and Paraphasias

(0) No words or short, meaningless utterances.

(1) Recurrent stereotypic utterances with varied intonation, conveying some meaning.

(2) Single words, often paraphasias, effortful and hesitant.

(3) Fluent recurrent utterances or mumbling, very low volume jargon.

(4) Halting, telegraphic speech. Mostly single words, often paraphasic but with occasional verbs or prepositional phrases. Automatic sentences only, e.g., “Oh I don’t know.”

(5) Often telegraphic but more fluent speech with some grammatical organization. Paraphasias may be prominent. Few propositional sentences.

(6) More complete propositional sentences. Normal syntactic pattern may be present. Paraphasias may be present.

(7) Phonemic jargon with semblance to English syntax and rhythm with varied phonemes and neologisms. May be voluble; must be fluent.

(8) Circumlocutory, fluent speech marked word finding difficulty, verbal Par aphasias. May have semantic jargon. The sentences are often complete but may be irrelevant.

(9) Mostly complete, relevant sentences; occasional hesitation and/or Paraphasias. Some word finding difficulty. May have some articulatory errors.

(10) Sentences of normal length and complexity, without definite slowing, halting, or articulatory difficulty. No Paraphasias.

II. Auditory Verbal Comprehension:

Yes/ No Questions:

Explain to the patient that you are going to ask certain questions and that the answers should be either “yes” or “no” If it is difficult to establish a consistent verbal or gestural yes no response, then eye closure for “yes” should be established. The instructions should be repeated, if necessary, during the test. Reinforce the patient when he or she gets into the set of answering as requested, but avoid nodding or commenting on specific items., If the patient self –corrects, the last answer is scored. If a patient gives an ambiguous or confabulatory response, repeat the instructions and the question and score accordingly if the response is still ambiguous, score 0, score 3 points for each correct answer. Record responses in the appropriate column: verbal, gesture, or eye blink.

Verbal Gesture Eye Blink

1. Is your Name ram? (“No” should be correct)
2. Is your Name Brown? (“No” should be correct)
3. Is your Name____ (real name)?
4. Do you live in Erode?(No should be correct)
5. Do you live in_____ (real residence)?
6. Do you live in Windsor? (“No” should be correct)
7. Are you A Man / Woman? (“Yes” should be correct)
8. Are you A Doctor? (“No” should be correct)
9. Am IA Man/Woman? (“Yes” should be correct)
10. Are the Lights on in this room? (“Yes” should be correct)
11. Is the Door closed? (“Yes” should be correct)
12. Is this a hotel?
13. Is this ____ (real test location)?

14. Are you wearing red pyjamas? (“No” should be correct)
15. Will paper burn in fire?
16. Does March come before June?
17. Do you eat a banana before you peel it?
18. Does it snow in July?
19. Is a horse larger than a dog?
20. Do you cut the Grass with an Ax?

Maximum Score: 60

Patient’s Score ____

B. Auditory Word Recognition

Place the real objects in a random cluster making sure that they are within the patient’s intact field if hemianopsia is present. Present cards of the pictured objects, forms, letters, numbers, and colors. Ask the patient to point to the furniture, his or her body parts, and fingers, or, “show me the____”. One repetition of each command is allowed. If the patient points to more than one item, score0, unless it is clear that the patient recognizes his or her error and corrects it. For the seven items requiring left- right discrimination, the patient must get both the side and body part correct to receive credit. If the room does not have certain furniture, substitute comparable items.

Real Objects	Drawn Objects	Forms	Letters	Numbers
Cup	Matches	Square	J	5
Matches	Cup	Triangle	F	61
Pencil	comb	Circle	B	500
Flower	Screwdriver	Arrow	K	1867
Comb	pencil	Cross	M	32
Screwdriver	Flower	Cylinder	D	5000

Colors	Furniture	Body parts	Fingers	Right-Left
Blue	Window	Ear	Thumb	Right shoulder
Brown	Chair	Nose	Ring Finger	Left Knee
Red	Desk	Eye	Index Finger	Left Ankle
Green	Light	Chest	Little Finger	Right Wrist
Yellow	Door	Neck	Middle Finger	Left Elbow
Black	Ceiling	Chin	Right Ear	Right Cheek

Maximum score: 60

Patient's score_____

C. Sequential Commands:

Score for partial execution of the commands according to the numbers above each segment that is correctly executed. If the patient requests repetition or looks confused repeat the command as a full sentence. On the table before the patient line up the pen, comb, and book in this respective order and label each verbally: “see the pen, the comb, and the book? I will ask you to point to them and do things with them just as I say, are you ready?” If the patient does not seem to understand the task, point with the comb to the pen to demonstrate, and start again.

	Score
Raise your hand	2
Shut your eyes	2
Point to the chair	2
Point to the window, then to the door	4
Point to the pen and to the book	4
Point with the pen to the book	8
Point to the pen with the book	8
Point to the comb with the pen	8
With the book point to the comb	8
Put the pen on top of the book then give it to me	14
Put the comb on the other side of the pen and turn over the book	20

Maximum SCORE: 80

Patient’s Score _____

III. Repetition

Ask the patient to repeat the words listed below; then record the responses. You may repeat items once, if the patient asks or does not seem to hear. If incompletely repeated, score 2 points for each recognizable word. Minor dysarthric errors or colloquial pronunciation are scored as correct. Take 1 point off for errors in order of word sequence or for each literal paraphasia (phonemic errors).

	Maximum Score
1. Bed	2
2. Nose	2
3. Pipe	2
4. Window	2
5. Banana	2
6. Snowball	4
7. Forty-five	4
8. Ninety-five percent	6
9. Sixty-two and a half	10
10. The telephone is ringing	8
11. He is not coming back	10
12. The pastry cook was elated	10
13. First British Field Artillery	8
14. No ifs, ands or buts	10
15. Pack my box with five dozen jugs of liquid veneer	20

Maximum Score: 100

Patient's Score_____

Object Naming:

IV. Naming

Present objects in the order listed below. If no or incorrect responses to visual stimulus, let the patient touch the stimulus. If still no or incorrect responses, present a phonemic of, if a composite word , a semantic cue (the first half of the word). Allow a maximum of 20 seconds for each item. Score 3 points if named correctly or with minor articulatory error, 2 points for a recognizable phonemic paraphasia, and 1 point if a phonemic or tactile cue is required.

Stimulus	Response	Tactile Cue	Phonemic Cue	Score
Gun				
Ball				
Knife				
Cup				
Safety pin				
Hammer				
Toothbrush				
Eraser				
Padlock				
Pencil				
Screwdriver				
Key				
Paperclip				
Pipe				
Comb				
Elastic				

Spoon

Scotchtape

Fork

Matches

Maximum Score: 60

Patient's Score_____

B.Word Fluency:

Ask the patient to name as many animals as he or she can in 1 minute. The patient may be helped if hesitant; "Think of domestic animal, like the horse, or a wild animal, like tiger." The patient may be prompted at 30 seconds. Score 1 point for each animal named (except for those in the example), even if distorted by literal paraphasia.

Maximum Score: 20

Patient's Score_____

C. Sentence Completion:

Ask patient to complete what you say. Provide an example, such as "ice is (cold)". Score 2 points for correct response and 1 point for phonemic paraphasias. Accept reasonable alternatives, e.g, sugar is…..(fattening) but not grass is …(brown).

1. The grass is _____ (green).
2. Sugar is _____ (sweet or white).
3. Roses are red, violets are _____ (blue).
4. They fought like cats and _____(dogs)
5. Christmas is in the month of _____ (December).

Maximum Score: 10

Patient's Score___

D. Responsive Speech:

Score 2 points for acceptable responses, 1 point for phonemic paraphasias.

1. What do you write with? (pen, pencil)
2. What color is snow? (white)
3. How many days are in a week? (seven)
4. Where do nurses work? (hospital)
5. Where can you get stamps? (post office, variety store)

Maximum Score: 10

Patient's Score_____

TECHNIQUE

To start with, the primary etiology of aphasia must be stabilized or treated. After stabilizing, that's the only time that a therapist can start the rehabilitation of that patient. To regain a person's language function, he should start undergoing therapy as soon as possible subsequent the injury.

Language therapy

As there are no surgical or medical methods that are now available to treat Aphasia, conditions that occur from the head injury or stroke can be improved by the treatment of language therapy. The framing of what activities to use during a language therapy duration is critically done and would highly based on the therapists' assessment and diagnosis results on the individual. And also, there are some activities that are performed to treat Aphasia. So to treat the aphasic patient here two techniques are selected, they are

- Conventional language therapy.
- Constraint induced language therapy.

Conventional language therapy:

It is a usual and customary care to improve the language function. In conventional language therapy to improve the language function, the therapist use exercises and cards with pictures and etc.

Exercises:

Regular exercises and practice are required to strengthen the weak muscles and prevent them from further degeneration.

The exercise activities don't have to be much exhilarating. For the purpose of communication, the therapist can exercise the patient's weakened muscles by repetitive speaking of selected words, and projecting some facial expressions, like smiling and frowning.

The use of food also is helpful, as the patient is able to exercise articulators required for speech production such as the tongue and jaw, which may be weakened due to stroke.

Picture: I Tongue exercises

Naming: (Patient, name the pictures with help of therapist).

One of the materials used for therapy are picture cards. The pictures of daily living and everyday objects are used to improve and develop the word recall skills. These cards can act as a visual cue to improve the learning process of an Aphasic. These can also help to increase the vocabulary of these patients.

By showing these picture cards and repeatedly saying the names of the objects in the picture aloud, the patient will be able to work the weak muscles and practice vocalization.

Picture: II Naming the picture parts

Repetition:

Repeat the picture names with help of therapist.

Picture: III Repeat the names

Sentence completion:

Here the patient forms a sentence by using the above used Pictures with help of therapist and complete that sentence.

Picture: IV Complete the Sentence

Following instructions:

Therapist give the instructions to the patient, how to perform.

Picture: V Following the therapist's instructions

Conversations on patients interest topics:

Here a small conversation between therapist and patient. The conversation topic selected according to patient interest.

Picture: VI Conversation between therapist and patient

Note: In conventional language therapy the patient can able to use Body language, lip movements, gestures and etc...

Constraint induced language therapy:

It is an intensive language training program. Based on the American stroke association (2006), this short term technique takes the three principles of CIMT and hence applies them to speech therapy. In the speech therapy,

Constraint means: Preventing the use of compensatory strategies like gesturing, drawing, writing etc.

Forced use : Means communicating through talking,

Massed practice : Means 2 to 4 hrs of speech therapy a day.

Thus, CILT is given in a communicative environment constraining the patients to practice systematically with which they have difficulty.

Word Games:

- Material constraints

  Use of minimal pairs e.g. Sock-Rock, not use chip-ship like words…

- Shaping and rule constraints

  Form sentences e.g. Mr. Ram give me two White socks…

Picture: VII Shaping the words

- Reinforcement contingencies

  Therapist encourages the patient to use constraints.

Picture: VIII Reinforcing the language

Note: In constraint induced language therapy the patient couldn't able to use body language, gestures and etc…try to produce speech…

INFORMED CONSENT TO PARTICIPATE VOLUNTARILY IN A RESEACH INVESTICATION

NAME :

AGE :

SEX :

OCCUPATION :

ADDRESS FOR COMMUNICATION :

DECLARATION

I have fully understood the nature and purpose of the study. I accept to be a subject in this study. I declare that the above information is true to my knowledge.

DATE :

PLACE :

Signature of the subject

ASSESSMENT CHART

NAME :

AGE :

SEX :

SIDE :

MODE OF TREATMENT : CONVENTIONAL LANGUAGE THERAPY / CONVENTIONAL LANGUAGE THERAPY and CONSTRAINT INDUCED LANGUAGE THERAPY

MEASUREMENT :

PARAMETER	BEFORE TREATMENT	AFTER TREATMENT
WESTERN APHASIA BATTERY		